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Narrow-line Seyfert 1 galaxies - rebels of the AGN family

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The presence of powerful relativistic jets in narrow-line Seyfert 1 galaxies (NLS1) was confirmed when Fermi detected gamma-rays from a handful of them. In the current active galactic nuclei (AGN) paradigm powerful relativistic jets are produced only in massive elliptical galaxies with supermassive black holes, but NLS1 galaxies challenge this scenario since they have lower black hole masses, higher accretion rates, preferably compact radio morphology and they reside mostly in spiral galaxies.

Due to Fermi's discovery the AGN unification schemes have to be revised to fit in NLS1 galaxies. It also invokes questions about the AGN evolution; what triggers and maintains the AGN activity, and what are the evolutionary lines of the different populations? NLS1 galaxies complicate the whole AGN scenario, but also offer a new perspective at the jet phenomena.

NLS1 galaxies are a poorly studied class of AGN. It seems that a surprisingly large fraction of them are radio-loud and thus possibly host jets; but also some of them seem to be radio-silent. This, as well as other observational evidence, implies that they do not form a homogeneous class. However, we are not certain what is the origin of the radio loudness, but, for example, the properties of the host galaxy and the large-scale environment might play a role.

We used various statistical methods, for example, multifrequency correlations and principal component analysis to study a large sample of NLS1 sources. Here we present the results and discuss the interplay between their properties, such as emission properties, black hole masses, large-scale environments, and their effect on radio loudness. We also present the first results of the Metsähovi Radio Observatory NLS1 galaxy survey and show some highlights of individual sources.

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